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PSILORHYNCHUS GRACILIS, A NEW CYPRINOID FISH FROM THE GANGETIC LOWLANDS

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ABSTRACT: ***Psilorhynchus gracilis*** **is described from 147 specimens collected at 10 lowland localities in Bangladesh. Of the four previously described species of *Psilorhynchus* (*balitora, homaloptera, pseudecheneis,* and *sucatio*), the new species resembles *P. balitora* most closely. The new species is compared with *P. balitora* and *P. sucatio,* both of which are syntopic species of the Gangetic plains. *P. sucatio* may be distinguished from *P. balitora* and the new species by its reduced dorsal ray count and numerous shape and coloration differences. *P. balitora* differs from the new species in lateral line and circumferential scale counts, number of unbranched pectoral rays, coloration, and shape of the head and mouth parts. The preferred habitat and distribution of the three lowland species are compared, and a key to the genus *Psilorhynchus* is provided.**

INTRODUCTION

Fishes of the genus *Psilorhynchus* McClelland are known to occur primarily in the Gangetic drainage of southern Asia, where four described (Menon 1974) and one undescribed species are found. Most ichthyologists (following Hora 1925) have recognized *Psilorhynchus* as the sole genus in the family Psilorhynchidae. A recent re-analysis of the relationships of *Psilorhynchus* has been published by Chen (1980), who believes the genus to belong to the Cyprinidae. I have not located a copy of that publication and must reserve comment at this time.

Of the five known species, two (*Psilorhynchus homaloptera* Hora and Mukerji, 1925, and *P. pseudecheneis* Menon and Datta, 1964) have relatively smaller scales and greater numbers of simple pectoral rays than the remaining three species. These small-scaled species also prefer high-gradient streams located in the eastern Nepalese Himalayas (*P. pseudecheneis*) and the Naga Hills of the Assam-Burma border (*P. homaloptera*). The subspecies *P. homaloptera rowleyi* Hora and Misra, 1941, of the Chindwin River (Irrawaddy) is one of the two species of this genus from Burma (Fig. 1). These taxa from high-gradient streams are not known to present any taxonomic problems.

Two species from easily accessible lowland areas were described by Hamilton in 1822 as *Cyprinus sucatio* and *C. balitora.* While collecting in the People's Republic of Bangladesh in 1977 and 1978, I obtained three species from Gangetic lowland streams. Two of the species were those described by Hamilton and one is described, herein, as new.

Hamilton's (1822) somewhat brief original descriptions of two lowland species now referred to *Psilorhynchus* were not accompanied by figures, although he had prepared figures for them during his stay in India. Hamilton's figures are of prime importance because he kept no pre-

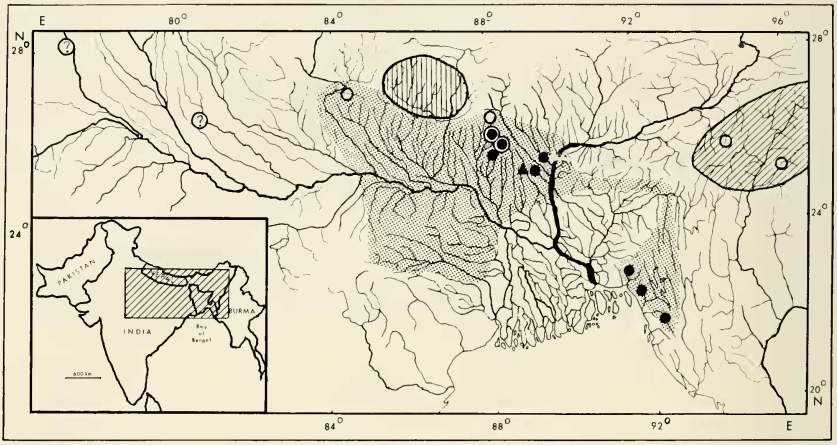

FIGURE 1. Distribution of the known species of *Psilorhynchus*. Inset map indicates region displayed. Darkened circles represent *P. gracilis* localities, with triangle marking the type-locality. Open circles are localities for *P. balitora*, with question marks in outlying non-verified reports. Two localities have both *P. gracilis* and *P. balitora*. Vertical hatching covers the range of *P. pseudecheneis*. Diagonal hatching shows the range of *P. homaloptera*. Stippling highlights the known range of *P. sucatio*.

served material. However, only half of the figures (and neither of the *Psilorhynchus* figures) were published in Hamilton's original monograph. The remaining figures were published subsequently by several authors including McClelland (1839), who published Hamilton's figures of *Psilorhynchus*. The reasons for this were explained partially by McClelland (1839) and more fully documented by Gudger (1924) and Hora (1929). Although he had seen but a single individual of one of the species, McClelland placed both species in the new genus *Psilorhynchus* and presumed that his single specimen was *P. balitora* (Hamilton), for which he coined a new specific name, *variegatus,* to replace *balitora*—a local term meaning sand-digger. McClelland preferred the use of classical Latin or Greek to the use of local dialects; for example, he changed the homalopterid generic name *Balitora* Gray, 1834, to *Platycara*. Such replacement of names is inadmissible under the present rules of nomenclature.

In Hamilton's figures (McClelland 1839:pl. 50), *Psilorhynchus sucatio* is easily recognized; however, I collected two species which resemble the illustration of *P. balitora*. Because McClelland's *P. variegatus* refers to an individual of a *balitora*-like species, the possibility that his species may have been distinct from Hamilton's will also be explored.

MATERIALS AND METHODS

Measurements were made to the nearest 0.1 mm with dial calipers. Standard length was measured from the snout tip to the base of the caudal fin. All pre-fin lengths extend from the tip of the snout to the base of the first unbranched ray at fin origin. Dorsal and anal fin lengths are measures of the longest simple ray, whereas the paired fins are depressed and measured from insertion to posteriormost extension. Caudal fin length is measured from the posterior end of the urocentrum to the tip of the normally spread upper fork. Body depth is measured from dorsal fin origin to pelvic fin insertion. The snout to occiput length (head length = HL) is the distance to the posterior margin of the supraoccipital bone. The snout to preopercle length is taken on a horizontal. Snout to maxilla length is measured to the posterior end of the maxilla. Orbital measurements are taken to the bony margin. Mandible length is distance from the symphysis to articulation with the quadrate. Gape width is the distance between the two articulation points of upper and lower jaw.

Fin-ray counts are expressed with lower case Roman numerals signifying unbranched rays and Arabic numerals for branched rays. The deeply divided final branched ray in both the dorsal and anal fin is counted as one. Caudal counts list procurrent rays of the upper fork as Roman numerals with Arabic numerals for principal rays of the upper/lower forks followed by Roman numerals giving lower-fork procurrent rays. Lateral line scales were counted for the body and tallied separately from those on the caudal fin base. Lateral transverse counts include the median scale at the dorsal fin origin, record the lateral line with a slash (/), and include the median ventral row before the anal fin. Circumferential counts encircle the body on the scale row immediately anterior to the dorsal and pelvic fins. Circumpeduncular counts include all scales around the peduncle at its narrowest region. The number of anal scales refers to median scale rows between the anus and anal fin. Belly scale rows include all complete, free-edged midventral scale rows crossing anterior to the pelvic fin insertion. Counts given for lateral blotches include all distinct midlateral blotches whether or not they are perfectly bisected by the lateral line.

Body measurements are summarized as percent standard length (% SL), head measurements as percent head length (% HL).

Most of the material was collected by the author and is housed at the Museum of Zoology, The University of Michigan, Ann Arbor (UMMZ) or at the Chandpur Freshwater Fisheries Research Station, Chandpur, Bangladesh (CFRS). Other specimens are from the American Museum of Natural History, New York (AMNH), and the Stanford University (SU) collection now housed at the California Academy of Sciences, San Francisco. Paratypes of the new species have been deposited at all aforementioned institutions plus the Field Musuem of Natural History, Chicago (FMNH), the Academy of Natural Sciences of Philadelphia (ANSP), and the United States National Museum, Washington, D.C. (USNM).

Distribution maps are part of drainage maps of the southern half of the Asian continent drafted by the author from the most recent world-wide series of 1:5,000,000-scale topographic maps prepared by the U.S. Defense Mapping Agency.

Psilorhynchus McClelland

Psilorhynchus McClelland, 1839:300, 428 (type-species *Cyprinus sucatio* Hamilton, by subsequent designation of Jordan 1919).

Diagnosis.—Body arched dorsally and flattened ventrally. Anteriorly depressed, becoming cylindrical with lateral compression posteriorly. Ventral surface of head markedly flattened. Mouth small, inferior, and transverse with a projecting snout; devoid of barbels. Pharyngeal teeth uniserial. Gill membranes joined broadly to isthmus with aperture extending ventrally to base of pectoral fin. Paired fins inserted horizontally. Breast naked. Scales moderate to large, 31 to 50 pored scales on the complete lateral line. Fin-ray counts: D ii–iii/7–9; A ii–iii/5; P_1 iv–x/9–12; P_2ii/7. Anus very close to pelvic fin; at least 8 scale rows separate anus from anal fin.

Key to the Species of *Psilorhynchus*

1a. Branched dorsal fin rays 7 2
1b. Branched dorsal rays 8 (or 9) 4

2a. Abdomen fully scaled; simple pectoral rays 4 ..... *sucatio* (Hamilton)
2b. Abdomen naked; simple pectoral rays 7–10 3

3a. Total lateral line scales 42–44; simple pectoral rays 7 or 8; abdomen smooth ..... *homaloptera* Hora and Mukerji
3b. Total lateral rays 48–50; simple pectoral rays 10; abdomen with three transverse folds of skin ..... *pseudecheneis* Menon and Datta

4a. Gape width greater than mandible length; simple pectoral rays 6–7 (rarely 5) or more; circumferential scales 18 ..... *balitora* (Hamilton)
4b. Gape width much less than mandible length; simple pectoral rays 4–5; circumferential scales 16 ..... *gracilis* sp.nov.

Psilorhynchus gracilis sp.nov.

(Figures 2 and 3)

Holotype.—UMMZ 205342 (adult female, 50.5 mm SL), Jabuneswari River at Badarganj, Rangpur Dist., Bangladesh, 3 Apr. 1978.

Paratypes (all from Bangladesh).—UMMZ 205343 (26 specimens, 29.4–49.9 mm SL), and CFRS uncat. (9 spec.) same collection data as holotype. UMMZ 205337 (2 spec., 25.7–29.7), Sangu River at Bandarban, Chittagong Hill Tracts, 25 Dec. 1977; UMMZ 205345 (8, 34.1–40.7), Ghaghat River at Rangpur, Rangpur Dist., 3 Apr. 1978; UMMZ 205348 (31, 26.6–51.2), USNM 231693 (5), AMNH 43097 (5), CAS 50011 (5), and ANSP 148729 (5), and FMNH 94285 (5), Mahananda River at Tetulia, Dinajpur Dist., 5 Apr. 1978; UMMZ 205351 (15, 27.6–46.4), Keratoya River at Bhajanpur, Dinajpur Dist., 6 Apr. 1978; UMMZ 205353 (2, 34.3–39.0), Tangam River at Thakurgaon, Dinajpur Dist., 6 Apr. 1978.

Other Material Examined (all from Bangladesh).—UMMZ

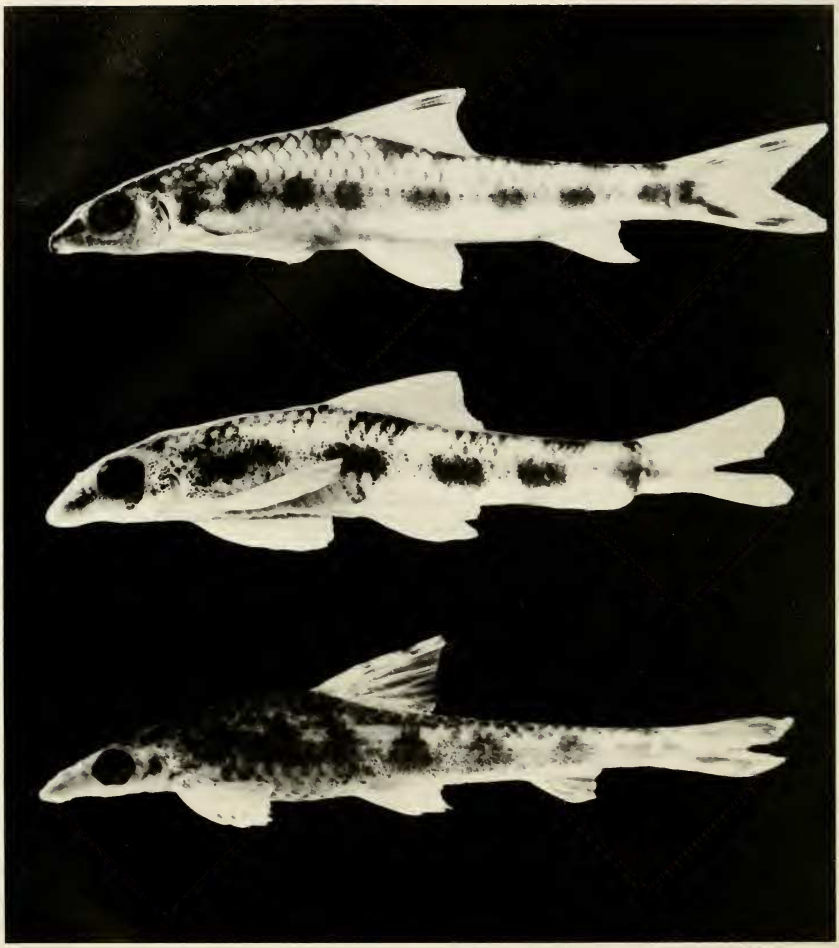

FIGURE 2. Young specimens of three lowland species of *Psilorhynchus* from Bangladesh. (*top*) *P. gracilis*, 34 mm SL, Jabuneswari River. (*middle*) *P. balitora*, 20 mm SL, Mahananda River. (*bottom*) *P. sucatio*, 64 mm SL, Rangapani Creek.

205340 (18, 10.4–19.0), Dharla River at Kurigram, Rangpur Dist., 2 Apr. 1978; CFRS uncat. (3, 33.8–35.4), Muhuri River, 10 km NE of Feni, Noakhali Dist., 2 Feb. 1978; CFRS uncat. (1, 40), Halda River at Daulatpur, 40 km N of Chittagong, Chittagong Dist., 24 Feb. 1978; CFRS uncat. (6) Halda Creek at Khaia Bazaar, 53 km N of Chittagong, Chittagong Dist., 24 Feb. 1978.

DIAGNOSIS.—Lateral line scales 33 to 36 on body plus 1 or 2 pored scales on caudal fin, totalling 35 to 37; pectoral fin with 4 or 5 simple rays; branched dorsal rays 8 (rarely 9); 2 distinct dorsal spots anterior to dorsal fin origin with a third at the origin; midventral region scaleless anteriorly, with 2 to 5 complete, free-edged scale rows immediately anterior to pelvic fin insertion; pectoral fin short, extending beneath dorsal fin origin, but never reaching pelvic insertion; eye

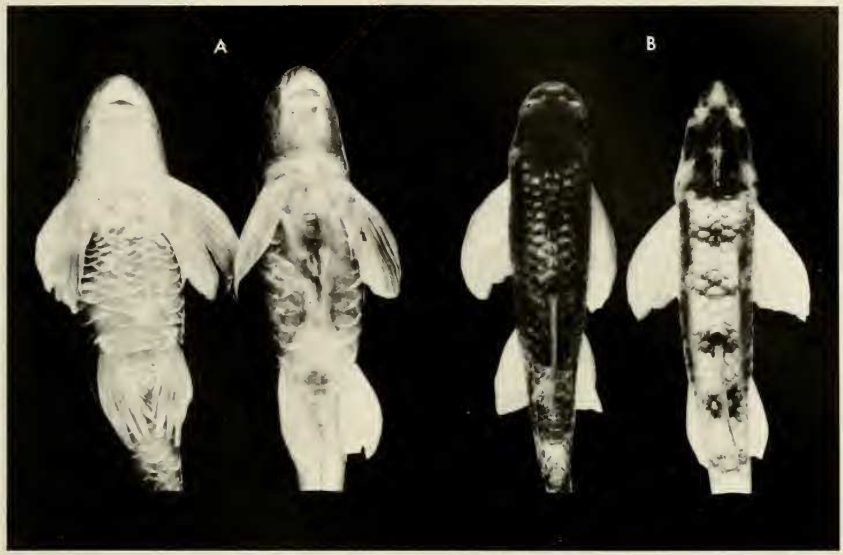

FIGURE 3. Comparison of ventral (*A*) and dorsal (*B*) aspects in *Psilorhynchus balitora* and *P. gracilis*. In each pair, left is *P. balitora*, and right is *P. gracilis*. In ventral aspect (*A*), *P. balitora*, 39 mm SL, Siliguri, and *P. gracilis*, 47 mm SL, Jabuneswari River. In dorsal aspect (*B*), *P. balitora*, 27 mm SL, Mahananda River, and *P. gracilis*, 32 mm SL, Jabuneswari River.

in upper part of head, not visible from below; no spots on anal or paired fins, although membrane between first 5 pectoral rays slightly darkened in some adults.

DESCRIPTION.—Predorsal scales 10 or 11; circumferential scales 16 (rarely 15 or 17); circumpeduncular scales 10; lateral transverse scale-rows 4/3; scale rows between anus and anal fin 8 or 9. Scales one row above lateral line immediately posterior to dorsal fin have 6 or 7 radii in adults of 50 mm SL.

Paired fins inserted horizontally; pectoral with 4 or 5 unbranched rays and 9–12 branched rays, totalling 14–17 elements, extending as far as dorsal fin origin when depressed, with distal margin separated from pelvic fin insertion by at least 2 scale rows; pelvic fin inserted slightly posterior to dorsal fin origin, with 2 simple and 7 branched rays. Dorsal fin closer to snout tip than to caudal base, with 3 simple and 8 (rarely 9) branched rays. Anterior and posterior rays of equal extension in depressed dorsal fin, which when normally expanded has an oblique and concave posterior margin. Anal fin short and somewhat falcate, its posterior margin well in advance of caudal fin, with 3 simple and 5 branched rays. Caudal fin deeply and evenly forked, possessing 19 (10/9) principal rays preceded by 6 or 7 procurrent rays above and 5 or 6 below. Body elongate, arched above and generally flat below; greatest depth at dorsal fin origin and greatest width at pectoral fin insertion; shape somewhat depressed anteriorly, gradually becoming cylindrical, then compressed posteriorly.

Head depressed, ventral mouth small and transverse. Upper lip separate from upper jaw by a deep groove and from snout by a shallow groove. Ventral surface of snout separated from lateral surfaces by deep rostral grooves. Upper lip joined to lower lip at corner of mouth by a fairly prominent flap of skin. Lower lip thick and followed on chin by a number of large, globular papillae which decrease in size posteriorly. Lower jaw long, its length much greater than width of gape. Gill membranes broadly joined to isthmus; gill aperture extends dorsally from pectoral fin base. Eye large, upper margin level with flat interorbital space; width of orbit approximating inter-

orbital width. Tip of snout somewhat pointed if viewed from dorsal aspect.

Nuptial tubercles evident on large males, randomly distributed on head. Heaviest tubercle accumulation below eye on lower part of cheek where eruption takes form of tight clusters rather than usual single pattern. Anterior body scales have tubercles bordering their free margins. Tubercle distribution on body progressively sparser posteriorly. Pectoral fins on breeding males show single row of tubercles ornamenting dorsal surface of each ray, with tubercles on anterior rays largest. Pelvic fins with same pattern but with smaller tubercles. Large females have same tubercle distribution as males but with slight differences. Females have lower tubercle density than males, lack tubercles on paired fins, and do not display tubercles in the clumped suborbital pattern of males.

Coloration.—Generally recognizable in specimens greater than 15 mm SL, although variable. Laterally, a series of 7–10 dark blotches with posteriormost extending onto caudal fin. First lateral blotch midway between lateral line and base of pectoral fin in small specimens. This spot enlarges with age, to cover lateral line. Lateral line always bisects remaining large lateral spots. Middorsal spots discontinuous with lateral spots; dorsal spots on same transverse scale rows as lateral blotches, having identical counts on all specimens. Where fish has unequal lateral spot counts, some dorsal spots obliquely cross middorsal line, and on each side are still on same scale rows as lateral spots. Two distinct dorsal spots anterior to dorsal fin origin, with another at origin and a fourth under posterior dorsal fin rays. Four or five spots between dorsal fin and caudal fin. All scales of back and upper side have marginal melanophores connecting to create network ventrally to just below lateral line. Network darkens with age, but always distinct. Head dark dorsally with light median-longitudinal streak flecked with large discrete melanophores from snout to posterior edge of occiput. A dark band projects from each nostril to coalesce anteriorly at tip of snout. Pigment lacking on fins of small specimens, appearing gradually at 30 mm SL and increasing substantially with size. Caudal fin ultimately has 2 black blotches per lobe, with proximal spot often joining median spot at caudal base. Dorsal fin has apical spot which runs along anterior 2 or 3 rays. No blotches on paired fins, although large specimens have darkened membranes between first 4 or 5 pectoral rays. Peritoneum dense black dorsally, becoming an irregular medium to dark gray below.

Etymology.—The Latin adjective *gracilis* (gender masculine) was chosen because of the fish's slender shape, which immediately distinguishes the new species from *Psilorhynchus balitora,* the most similar species.

Comparison of Species

Several counts aid in distinguishing the three lowland species. The diagnostic counts (Table 1) demonstrate resemblances between *P. gracilis* and *P. balitora* in dorsal rays and total pectoral fin elements. However, lateral line and circumferential counts are closest between *P. gracilis* and *P. sucatio.* Belly squamation is distinctive in *P. gracilis,* which never has more than two to five midventral scale rows anterior to the pelvic fins. *P. sucatio* always has a fully scaled belly and sympatric specimens of *P. balitora* never exhibit fewer than eight midventral prepelvic scale rows. Specimens from the Chindwin River, Burma, and the Rapti River, Nepal have naked breasts and bellies, but are typical *P. balitora* in all other respects. Both *P. homaloptera* and *P. pseudecheneis* have scaleless bellies. Two AMNH 15767 paratypes of *P. homaloptera* from the Naga Hills were incorrectly identified. One is *P. balitora* with typical counts and measurements which have been included in all four tables. The other specimen is a loach (genus *Noemacheilus*).

Several proportional measurements show notable differences. However, overlap in proportional measurements may occur when juveniles are included, even though adult proportions display pronounced differences. For instance, of seven measured *P. balitora,* four adults were over 40 mm SL and three juveniles were less than 30 mm SL. The robust adults have a body depth of 25.5% SL, whereas the juveniles have a body depth of 19.4% SL (Table 2). Juvenile proportions of *P. balitora* overlap with those of adults of the other two species. Other proportions distinguishing *P. gracilis* from *P. balitora* at any size are those for the anal, pectoral, and pelvic fins. Proportions (taken as % HL) differing consistently in these two species are interorbital width, gape width, and mandible length (Table 2). A single perfectly discriminating character is gape width, which is considerably less than the man-

TABLE 1. DIAGNOSTIC COUNTS FOR THE THREE LOWLAND SPECIES OF *PSILORHYNCHUS*. Number counted in parentheses.

	P. balitora	*P. gracilis*	*P. sucatio*
Dorsal fin rays	iii/8 (17)	iii/8–9 (18)	ii/7 (18)
Pectoral fin rays	v–viii/7–9 (41)	iv–v/9–12 (60)	iv/8–9 (18)
Caudal fin rays	v–vi, 9/8, iv–v (10)	vi–vii, 10/9, v–vi (18)	iii–iv, 9/9, iii (18)
Lateral line scales	30–34 + 1 or 2 (41)	33–36 + 1 or 2 (60)	34–35 + 1 or 2 (18)
Circumferential scales	17–20 (41)	15–17 (60)	16–18 (18)
Anal scales	9–10 (17)	8–9 (18)	8–11 (13)

dible length in *P. gracilis*, whereas the size relationship is reversed in *P. balitora*.

Psilorhynchus gracilis differs from *P. sucatio* in the depth of the caudal peduncle and several head-measurement proportions, most notably the interorbital width: approximating the orbital width in *P. gracilis* and nearly doubling the orbital width in *P. sucatio*. Also, in *P. sucatio* the anterior dorsal rays show greater extension when depressed, whereas *P. gracilis* and *P. balitora* have equal or greater posterior extension of the last rays.

Color patterns are most similar between *P. gracilis* and *P. balitora* in younger specimens. Therefore, sub-adults have been illustrated (Fig. 2). Juveniles of *P. sucatio* have a continuous black midlateral stripe extending from opercle to caudal fin. The stripe fades with age, and gradual coalescence of blotches gives the adult color pattern. Remnants of the stripe can be seen on the figured specimen as discrete melanophores between the lateral spots. Dorsally, *P. sucatio* exhibits darkening of entire scales rather than the reticulated network found in *P. gracilis* and *P. balitora*. Both *P. gracilis* and *P. balitora* always have a series of lateral blotches with smaller and more numerous spots on *P. gracilis* (Table 3). The lateral spots on *P. gracilis* and *P. balitora* are on the same diagonal scale rows as the dorsal spots. On *P. gracilis* dorsal and lateral spots are totally distinct, whereas *P. balitora* exhibits a faint continuous band between the lateral and dorsal spots. The predorsal spot pattern (Fig. 3) for *P. gracilis* is two distinct blotches with a third at the dorsal fin origin, and for *P. balitora* a single blotch, with a second beginning at the dorsal origin. In adult *P. balitora* the dorsum gradually darkens causing the pattern to become somewhat obscure, although it still persists. *P. gracilis* retains a distinct reticulated pattern throughout adult life.

A recently described taxon *Psilorhynchus*

TABLE 2. PROPORTIONAL MEASUREMENTS FOR THREE SPECIES OF *PSILORHYNCHUS*. Characters 2 through 9 expressed as %SL. Characters 10 through 15 expressed as %HL (snout to occiput).

	P. balitora		*P. gracilis*		*P. sucatio*	
	Range (mm)	$\bar{x}$ ± SD	Range (mm)	$\bar{x}$ ± SD	Range (mm)	$\bar{x}$ ± SD
1. Standard length	22.7–47.8	(n = 7)	28.2–51.2	(n = 10)	26.4–64.3	(n = 13)
2. Snout to dorsal fin	48.1–52.8	50.3 ± 2.1	44.6–47.9	46.8 ± 1.1	43.9–48.9	46.3 ± 1.6
3. Snout to pectoral fin	22.4–23.9	23.2 ± 0.5	18.8–22.7	20.1 ± 1.3	19.7–23.1	21.0 ± 1.1
4. Body depth	18.5–26.9	22.9 ± 3.5	18.0–21.4	19.7 ± 1.3	15.7–21.4	18.3 ± 1.9
5. Peduncle depth	8.2–9.4	8.9 ± 0.4	7.5–8.4	8.0 ± 0.3	6.1–7.3	7.0 ± 0.4
6. Pectoral fin length	25.9–28.7	27.4 ± 1.0	21.0–23.4	22.4 ± 0.8	17.3–22.7	20.6 ± 1.6
7. Pelvic fin length	20.7–22.9	21.5 ± 0.3	16.9–19.9	18.4 ± 1.0	16.4–19.3	18.4 ± 1.0
8. Anal fin height	15.4–18.0	17.0 ± 0.9	14.2–15.2	14.8 ± 0.4	12.1–14.4	13.0 ± 0.9
9. Snout to occiput	23.0–24.8	24.1 ± 0.6	20.3–24.0	22.0 ± 1.3	20.4–23.9	21.5 ± 1.0
10. Snout to maxilla	32.3–35.6	33.6 ± 1.3	23.6–31.0	27.8 ± 2.4	25.5–32.2	31.0 ± 0.9
11. Orbit width	31.3–35.4	33.4 ± 1.5	30.3–33.8	31.8 ± 1.0	25.2–30.5	27.7 ± 1.7
12. Interorbital width	36.5–41.6	38.6 ± 2.0	29.8–36.3	33.7 ± 2.0	42.8–56.5	50.0 ± 4.7
13. Gape width	26.8–31.6	28.4 ± 2.0	19.1–24.7	22.1 ± 1.6	23.3–28.2	25.6 ± 1.9
14. Mandible length	19.6–23.6	21.4 ± 1.5	29.4–42.5	33.9 ± 4.1	25.0–32.7	27.3 ± 2.3
15. Head depth at pupil	46.4–55.3	51.0 ± 3.1	39.4–47.3	43.8 ± 2.8	33.6–42.0	38.6 ± 2.7

Table 3. Distribution of Values for Characters Distinguishing *Psilorhynchus gracilis* and *P. balitora*. Counts for *P. gracilis* holotype are underlined.

Total lateral line scales	32	33	34	35	36	37
P. gracilis	0	0	0	40	19	1
P. balitora	3	21	12	4	1	0
Simple pectoral rays	4	5	6	7	8	
P. gracilis	32	28	0	0	0	
P. balitora	0	5	19	16	1	
Circumferential scales	15	16	17	18	19	20
P. gracilis	3	55	2	0	0	0
P. balitora	0	0	4	26	3	8
Lateral blotches	5	6	7	8	9	10
P. gracilis	0	0	16	33	9	2
P. balitora	23	16	2	0	0	0

sucatio var. *damodarai* David, 1953, appears to be a local race of *P. sucatio* with slightly larger pectoral fins than those found on individuals from Bangladesh. The Damodar River variety is also listed as having "8" branched dorsal rays as opposed to "7–8" for Gangetic specimens. I have not seen any specimens with eight branched dorsal rays, although the deeply divided last ray could be erroneously counted as such.

Discussion

Of the characteristics given for identification in Hamilton's description (1822), few would be of use in distinguishing species as similar as *P. gracilis* and *P. balitora*. However, Hamilton does state that there are approximately 12 rays in each pectoral fin. This count is closer to what I found for *P. balitora* (minimum 13) and fewer than in the new species (Table 3).

Hamilton's figure of the dorsal aspect reproduced in McClelland (1839) shows six simple rays in each pectoral fin, and anterior-dorsum and head color patterns identical to my observations for *P. balitora*. Hamilton's figure displays the anterior part of the dorsum on *P. balitora* with one blotch midway between the occiput and the dorsal fin, and another at the dorsal fin origin on both lateral and dorsal views. The dorsal coloration of the head has two black spots separated by a transverse white line in the interorbital space. There is no longitudinal white streak from the snout to occiput as on the new species (Fig. 3). There are 34 total scale rows in longitudinal series, which better describes *P. balitora* (Table 3). Although the lateral blotches on Hamilton's illustration of the lateral aspect might correspond to the new species, six lateral spots are commonly seen in *P. balitora*, which also exhibits a lengthened anterior blotch similar to that in Hamilton's figure. The total dorsal spots illustrated in dorsal aspect might be high for *P. balitora*, however, even though both lateral and dorsal views are presumably taken from the same fish, the blotches do not match (the lateral view has one fewer dorsal spot on the peduncle). Because the lateral view shows an equal number of lateral and dorsal blotches, that would presumably be a better indicator of the dorsal spot pattern on the caudal peduncle than the illustrated dorsal aspect. From these characters it would seem that Hamilton's *Cyprinus balitora* is synonymous with my *Psilorhynchus balitora* rather than with the new species.

Psilorhynchus variegatus McClelland remains as a potential name for the new species. McClelland (1839:430) stated that his single specimen differed little from Hamilton's *balitora* except for a few features. McClelland listed 17 rays in the pectoral fins and 33 scales in the lateral line. The total of 17 pectoral fin elements occurs in both species as a maximum, but 33 lateral line scales is the mode for *P. balitora* and two scales below the minimum total count found in *P. gracilis* (Table 3). Therefore, it appears that *P. variegatus* McClelland is indeed a synonym of *P. balitora* (Hamilton) and that *P. gracilis* is a new species.

Other accounts in Day (1878) and Shaw and Shebbeare (1937) apply to *P. balitora*. No published account appears to have included the new species under the name *P. balitora*, which is rather surprising in view of its abundance and apparently widespread occurrence in the Gangetic lowlands.

Distribution and Habitat Preference

Thus far the new species has been collected only in Bangladesh. However, the extent of its preferred habitat would suggest a much wider distribution throughout the lower reaches of the Ganges and Brahmaputra rivers. The southernmost collections of *Psilorhynchus gracilis* in Bangladesh are from rivers that currently have

independent exits into the Bay of Bengal (Fig. 1). The species is also fairly common in sandy streams of northwest Bangladesh. *Psilorhynchus gracilis* was taken in the same collections with *P. balitora* and *P. sucatio* in the Mahananda River at Tetulia and the Keratoya River at Bhajanpur, both in Dinajpur District. *P. sucatio* was taken at each of my collection localities for *P. gracilis* except one site from the Muhuri River (Feni River drainage) of Noakhali District in southeast Bangladesh. However, *P. sucatio* was taken in two other collections from the Feni River drainage.

Psilorhynchus gracilis is found over small pebbles in shallow running waters where the bottom is primarily sand. In this regard it resembles *P. balitora* which is sometimes found in the same habitat but which is always closely associated with hard substrates. *P. gracilis* is generally free-swimming and occasionally rests on its spread paired fins. *P. balitora* prefers to maintain close fin contact with the substrate, often not moving unless strongly disturbed. *Psilorhynchus gracilis* may be caught easily on pebble outcrops having both species present because of its greater tendency to leave the bottom. A seine pulled under or through the gravel of the same outcrop catches *P. balitora*, which will be taken out along with the substratum. *P. sucatio* differs from the other lowland species in being taken primarily along the edges of sandy streams, and seems to be most abundant near emergent or overhanging vegetation. I have not observed *Psilorhynchus* burrowing, although several species of loaches were seen to burrow into sand within inches of *Psilorhynchus* under observation. Attempts to elicit burrowing by disturbing the fishes were not successful.

The *P. balitora* taken at the same localities as *P. gracilis* were all small, about half to two-thirds adult size. This possibly indicates that fully grown individuals occur upstream in areas of higher gradient. It is also consistent with the physical and behavioral characteristics of the species. *P. balitora* has much larger pectoral fins with more simple rays, and a wider and higher body predorsally. It depresses its head when positioned in an area of strong current, and is forced down onto its fins. This shape is common among Asian hillstream fishes which attach themselves to hard substrata in high-gradient streams (e.g., *Garra, Homaloptera, Gastromyzon*). This somewhat passive posturing for increased friction is a much more efficient method than constant swimming for maintaining position in the current of torrential streams. Thus, it would appear that northern Bangladesh may be the southernmost region of the Gangetic plain occupied by *P. balitora*, a species adapted to higher gradients than either *P. gracilis* or *P. sucatio*.

Comparative Material Examined

Psilorhynchus balitora—India: SU 28701 (2 specimens, 42.8–45.2 mm SL), Siliguri, North Bengal, no date given; SU 32627 (1, 40.2) Siliguri, North Bengal, Apr. 1937; AMNH 15767 (1, 47.8), Keleki Stream at Emilioni, Naga Hills, Assam (paratype of *Psilorhynchus homaloptera* Hora and Mukerji). Nepal: UMMZ 207678 (7, 33.1–37.2), Rapti River at Chitawan Valley, Apr.–May 1975. Burma: AMNH 13811 (14, 32.5–42.8), Upper Burma, Chindwin drainage. Bangladesh: UMMZ 205347 (19, 15.6–26.7) Mahananda River at Tetulia, Dinajpur Dist., 5 Apr. 1978; CFRS uncat. (15) same data; UMMZ 205350 (11, 14.1–18.6), Keratoya River at Bhajanpur, Dinajpur Dist., 6 Apr. 1978.

Psilorhynchus sucatio—Bangladesh: UMMZ 205338 (5 specimens, 20.2–22.6 mm SL), Sangu River at Bandarban, Chittagong Hill Tracts, 25 Dec. 1977; UMMZ 205339 (32, 46.3–73.3), Rangapani Creek, 6 km NNW of Jaintapur, Sylhet Dist., 19 Feb. 1978; UMMZ 205341 (5, 12.5–17.5) Dharla River at Kurigram, Rangpur Dist., 2 Apr. 1978; UMMZ 205344 (5, 15.5–55.6), Jabuneswari River at Badarganj, Rangpur Dist., 3 Apr. 1978; UMMZ 205346 (57, 13.8–58.8), Ghaghat River at Rangpur, Rangpur Dist., 3 Apr. 1978; UMMZ 205349 (42, 15.7–41.8), Mahananda River at Tetulia, Dinajpur Dist., 5 Apr. 1978; UMMZ 205352 (22, 11.1–50.7), Keratoya River at Bhajanpur, Dinajpur Dist., 6 Apr. 1978; UMMZ 205354 (37, 12.7–45.7), USNM 231694 (5), AMNH 43096 (5), and 50010 (5), ANSP 148728 (5), and FMNH 94284 (5), Tangam River at Thakurgaon, 6 Apr. 1973; CFRS uncat. (19, 34.2–71.9), Koilla Creek, 13 km W of Ramgarh, Chittagong Dist., 3 Feb. 1978; CFRS uncat. (8, 25–40), Feni River at Ramgarh, Chittagong Hill Tracts, 3 Feb. 1978; CFRS uncat. (3, 46.4–62.5), Tangam River at Kestapur, Dinajpur Dist., no date; AMNH 19648 (2) Sevoke River, Darjeeling.

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